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16 May 2013

Dear Sir/Madam

Addendum 2 of Forth Energy's Application for a "Renewable Energy Plant" at Dundee

Please find attached our comments on the Air Quality Assessment submitted as Addendum 2 of the above application.

Also included in our submission are comments on aspects of air quality not covered in detail in the Addendum, viz:

- the impact of particulate emissions from the proposed plant
- the impact of other toxins likely to be released from the proposed plant
- the impact of CO2 emissions from the proposed plant, in the light of the latest evidence, which has emerged since the previous consultation period closed and since Dundee City Council's Policy and Resources Committee considered the original application.

We previously submitted comments on the original application on 24 September 2010 but this submission was not logged at the time. We understand from a telephone call on 13 May 2013 that our previous submission has now been registered and will be taken into account if and when the application is considered by your team and the Ministers.

I would be grateful if you would confirm that this latest submission has been received within your deadline, and that our previous submission has also now been registered.

I can also confirm that we wish our submission to be copied to Dundee City Council.

Yours faithfully

Andrew Llanwarne
Co-ordinator

THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2000. SECTION 36 ELECTRICITY ACT APPLICATION ADDENDUM FOR PORT OF DUNDEE RENEWABLE ENERGY PLANT, AT THE PORT OF DUNDEE

RESPONSE FROM FRIENDS OF THE EARTH TAYSIDE 15 May 2013

Introduction

We are grateful for the opportunity to submit our comments on the Supplementary Environmental Information submitted by Forth Energy on 2 April 2013, in the form of an Addendum to the above application. Our response is set out below. We would be pleased to provide further explanation if required.

Previous consultation response

We previously submitted a response, on 24 September 2010, to the consultation on the original application. The contents of this earlier submission remain relevant to the revised proposal, although further comments are provided in this current submission on the latest research into greenhouse gas emissions from biomass combustion which has only become available in the interim. The Scottish Government's policy on the use of biomass for energy production has also been clarified since the consultation period on the original application, and it is therefore relevant to place this application with that policy context.

Contents of the current submission

This response will consider the following effects of the proposed plant:

- 1 – the impact of NO_x emissions on air quality and public health
- 2 – the impact of particulate emissions on air quality and public health
- 3 – the impact of other toxins likely to be released on air quality, public health and the environment
- 4 – CO₂ emissions, and the implications for Scotland's commitment to reduce greenhouse gas emissions
- 5 – conflict with Scottish Government policy on use of biomass set out in the Electricity Generation Strategy 2012

As requested, the Conclusions and Recommendations are contained in an Annex at the end.

1. The impact of NO_x emissions on air quality and public health

Nitric oxide emissions and conversion to nitrogen dioxide (together referred to as NO_x) are a main focus of the assessment set out in the Addendum. It reaches conclusions which are conveniently reassuring: *"the overwhelming majority of locations will experience a Negligible increase in annual mean NO₂ concentrations...due to operation of the REP"*.¹ However, this conclusion is dependent

¹ Forth Energy, Proposed Dundee Renewable Energy Plant, Addendum 2, paragraph 6.1.14

on estimates of the output of NO_x, and on the model used to calculate the ratio of conversion of NO to NO₂. The outdated model used (the Janssen approach) assumes a much lower level of conversion than the figure (70%) favoured by the Environment Agency in England and Wales and by SEPA (who rely on the same Environmental Agency guidance). The Addendum states that the Environment Agency approach is overly conservative and highly unrealistic.² However, the Environment Agency guidance states that, if initial screening at 100% of the modelled value for long-term average concentrations results in exceedences of the relevant air quality objectives (as at certain locations in this case), it expects the 70% ratio to be used. If a lower percentage is used, this has to be justified in the application reports.³

The commentary in the Addendum seeks to do this, but **the methodology used to argue that conversion to NO₂ is lower is deeply flawed**. It indicates a lack of understanding of the chemical processes involved, and how they differ during the day and night. It appears to assume that ozone is necessary for conversion of NO to NO₂, yet this is not the case. The model therefore relies on accurate figures of ozone levels, but no monitoring of ozone levels took place. No reliance can therefore be placed on the figure of 30 – 35 % in daylight hours and the figure is a serious underestimate of the night time conversion which can approach 100 % in an urban location. Thus, a daily average of 70% is an appropriately cautious figure on which to base the calculations. Table 11 in the Addendum shows the results of converting the projected REP emissions using the 70% figure. Two additional exceedences would be created at receptor locations 11 and 12, and existing exceedences would be worsened at three other receptors (locations 4, 5, and 22), all of those to a degree that would not be classed as ‘imperceptible’ or ‘negligible’. At two other receptors, NO₂ levels are already very close to the annual average NO₂ objective and would be brought significantly closer to it (locations 3 and 10). . We would look to Dundee City Council, given its legal responsibility for reducing air pollution levels and its duty of care for the citizens of Dundee, to consider these figures set out in Table 11 as the most appropriate for this exercise. Likewise we would urge Ministers to apply the 70% figure if the application comes to them for a decision. This alone should be sufficient for the application to be rejected, given the existing and persistent high levels of NO₂ in Dundee and the consequences for public health, particularly for those with respiratory diseases.

We are also unconvinced that the **initial estimates of NO_x emissions**, on which these calculations are based, are realistic as we understand that in practice the efficiency of the proposed abatement technology is usually around 70-80%, rather than the theoretical 90%.

Furthermore, the long-term averages smooth out the **twice-daily peaks** which result in the largest numbers of people being exposed to high levels of air pollution during the morning and evening rush hours. In the mornings, this includes children going to school. At this time of day the concentrations of NO₂ can often be four times the target average of 40 ug per m³, and these would be augmented by the emissions from the biomass plant which would be operating through the night, with conversion levels approaching 100%. The Addendum fails to take account of these daily peaks, the high level of exposure of members of the public to these, and the disproportionate impact which the biomass plant could have on the morning peak.

The case for rejecting Forth Energy’s conclusions is compounded by the **timing of the survey** for the baseline traffic figures, during a period when traffic along Broughty Ferry Road was severely

² *Ibid*, para 3.4.13

³ Environment Agency, Conversion Ratios for NO_x and NO₂, available at http://www.environment-agency.gov.uk/static/documents/Conversion_ratios_for_NOx_and_NO2_.pdf

disrupted by a lengthy period of road works. Although an adjustment was made in an attempt to allow for this, we consider this to be inadequate to take full account of the degree to which traffic was displaced onto other routes, and further assessment following completion of the road upgrade is required to provide more reliable baseline figures.

Furthermore, the assessment was carried out during a period when **levels of economic activity** had declined from the levels of previous years. It is expected that the economy will recover in a few years' time, and this will inevitably result in an upswing in traffic levels. Indeed, Tayplan projections indicate continued growth in traffic on the main commuter routes⁴. Whilst the Addendum holds out the hope that measures introduced as part of the Air Quality Management Plan will lead to a reduction in air pollution levels, the latest Air Quality Update and Screening Assessment states that concentrations of nitrogen dioxide and particulates "*are above the objective and have increased in many areas of the city since the AQMA was declared*"⁵. By 2017, when Forth Energy hopes its plant will come into operation, there could easily be more locations where background levels are close to or exceed the target levels.

Apart from the question of measurements, it should be recognised that the insidious effects of air pollution on human health are still not fully understood. For example, evidence has recently emerged from research at Yale University regarding the impact of indoor levels of NO₂ on asthmatic children. This shows that it causes severe symptoms at levels well below the "safe" target set by the US Environmental Protection Agency⁶. Another recent study in the US looking at the effect of living close to a fuel-fired power station concluded that "*Our results are consistent with the hypothesis that air pollution from fuel-fired power plants and volatile compounds coming from hazardous waste sites increases the risk of hospitalisation from respiratory diseases.*"⁷ Even before the addition of the proposed biomass power station, NHS Tayside figures show that **almost twice as many people are hospitalised in Dundee** with respiratory diseases compared with rural areas of Tayside⁸. Given the considerable uncertainties regarding the data on emissions and conversion to NO₂ set out in the Addendum, the people of Dundee should not have another source of air pollution imposed on them, in the centre of the city.

2. The impact of particulate emissions on air quality and public health

Forth Energy was not required to look into particulate emissions because Dundee City Council accepted that "*the predicted PM₁₀ impacts from the main stack can be considered 'negligible'*"⁹. No reference was made to **very fine particles** (PM_{2.5}) for which the fabric filter abatement technique is less effective, but which are increasingly recognised as seriously damaging to health as they can migrate from the lungs into the bloodstream and cause cardiovascular damage. These were, however, covered in the original Environmental Statement, where the emission rate for PM_{2.5} was estimated to be the same as for PM₁₀. This is a serious omission in the Addendum.

⁴ Tayplan Transport Topic Paper, 2011, paragraph 2.21, available at

<http://www.tayplan-sdpa.gov.uk/12.%20Topic%20Paper%207%20-%20Transport.pdf>

⁵ See p.2 of the 2012 report at http://www.dundee.gov.uk/sites/default/files/publications/DCC_USA-2012.pdf

⁶ Belanger, K, et al, 2013 – Household Levels of Nitrogen Dioxide and Pediatric Asthma Severity, *Epidemiology* 2013;24: 320–330)

⁷ Xiaopeng, L, et al, 2012, Association between Residential Proximity to Fuel-Fired Power Plants and Hospitalisation Rates for Respiratory Diseases, in *Environmental Health Perspectives*, Vol 120, No6, June 2012, pp 807-810..

⁸ NHS Tayside, Hospital Discharge Rates per 1000 Population with a Primary Diagnosis of Diseases of the Respiratory System by Geo-Urban/Rural 8-fold grouping in 2011/12. See Annex 2.

⁹ Forth Energy, Proposed Dundee Renewable Energy Plant, Addendum 2, paragraph 1.1.6

The Council's decision not to require further study of the impact of particulate emissions reflected the belief that the prevailing south-westerly **wind direction** would carry particulates away from the main "hotspots" in the central and western parts of Dundee. However, this dominant wind pattern has become less pronounced in recent years, with increasing prevalence of winds from an easterly direction particularly during the spring (April-June). This can be seen in the published data from Leuchars meteorological station¹⁰, showing that over the period 2000 – 2013, ESE has been the dominant wind direction in May and June. During March-April 2013, winds blew continuously from the eastern quadrant for several weeks, and this type of pattern would blow the emissions from the Port area through central and western Dundee, adding to existing exceedences.

For the rest of the year WSW is the dominant direction, so the emissions would be blown over the eastern half of Dundee and Monifieth, but it cannot be assumed that new "hotspots" would not be created. Background traffic and diesel engine emissions are expected to increase and the emissions from vehicles delivering fuel and removing waste from the proposed biomass plant would add to the levels of particulates in the air, along with the emissions from the plant itself. The emissions from the additional shipping bringing in timber should also be taken into account.

High levels of particulates can have **very rapid detrimental effects on the cardio-vascular system**, within a matter of hours, as was illustrated in a recent BBC TV programme ("Bang Goes the Theory", screened on BBC1 on 29 April 2013) using work carried out by Dr Jeremy Langrish at Edinburgh University. As with NO₂, particulate levels peak twice every day, and frequently reach levels three or four times the target average¹¹, when more people are exposed to them going to and from work and school.

Overemphasis on annual data means that no consideration has been given by the Council or Forth Energy to the consequences of easterly winds in the spring, hourly exceedences and short-term health effects.

The effects of **long-term exposure to particulates** were set out in a report in 2010 by COMEAP which concluded that this resulted in **29,000 premature deaths in the UK**¹². Moreover, knowledge of the effects of particulates on human health continues to grow, with additional consequences being identified in reports during 2013 on reduced birth weight¹³ and reduced survival rates for heart attack patients¹⁴.

It is becoming clear that it is **not the total mass** of particulates that is critical to public health, but the **number** of these; a very large number of very fine particles equate to just one PM₁₀ in terms of weight, but they have a much greater surface area and they are more easily transported through the body¹⁵. They are more likely to find their way into homes, schools and offices, and are also more likely to make their way into the lungs than PM₁₀s, which are easily trapped in the nose and throat. After causing inflammation in the lungs, they move into the blood circulation system where they affect the heart and arteries. This research also shows that **woody biomass produces**

¹⁰ http://www.windfinder.com/windstats/windstatistic_leuchars.htm

¹¹ See the Scottish Air Quality website, www.scottishairquality.co.uk

¹² See http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317137012567

¹³ See <http://www.medicalnewstoday.com/articles/255994.php>

¹⁴ See <http://eurheartj.oxfordjournals.org/content/34/17/1306>

¹⁵ Lighty, JS, et. al., Combustion Aerosols: Factors Governing Their Size and Composition, *Journal of Air Waste Management*, 50:1565; and Dr Bob Maynard, 2010, *Particle Matter and Particle Metrics*, Health Protection Agency, at http://www.npl.co.uk/upload/pdf/20100608_mansa_maynard_3.pdf

far higher levels of PM_{2.5} than coal. A study in Canada of over 2m people, published in 2012, seems to confirm the higher health risks from the very fine particulates. It showed mortality associated with PM_{2.5} *“at concentrations that were predominantly lower (mean, 8.7 ug/m³; interquartile range 6.2 ug/m³) than those reported previously.”*¹⁶ These levels are well below the target average for PM₁₀ of 18 ug/m³ which applies in Scotland. **Yet the emission levels and health impacts of PM2.5s have not been assessed in the Addendum.**

Therefore, the scope of research contained in the Addendum was too narrow, and more attention should have been given to the likely production levels of particulates, particularly PM_{2.5}s, and the month-by-month patterns of wind direction. The emissions of, and risks from, fine particulates should have been included in the assessment for the Addendum. **Further work should be required** before any conclusions can be reached on the likely impacts of the proposed biomass plant on air quality and public health. If however the application is passed to Ministers for a decision, based on the inadequate information provided, this would give **grounds for rejection** due to the risks to public health from exposure to particulates as well as nitrogen dioxide.

3. The impact of other toxins likely to be released on air quality, public health and the environment

Forth Energy provides in the Addendum estimates for the emissions of a range of other pollutants, including dioxins and furans, and a number of heavy metals. The actual range and volume of the toxins that would be produced is **impossible to predict** with any accuracy because of:

- the unknown composition and treatment of waste wood that could form up to 30% of the feedstock, and
- the unknown source of the virgin wood, since trees take up a range of chemical compounds during growth and are then treated with chemicals during conversion to wood pellets, including pesticides.

This means that the projections used in the original application and the Addendum are not reliable and are likely to be **under-estimates** for some pollutants. This uncertainty means that the Scottish Government and Dundee Councillors should exercise extreme caution in considering these emissions. Evidence provided at a Public Debate on the Forth Energy proposal on 1 May 2013 by Professor Andrew Watterson, Director of the Centre for Public Health at Stirling University, highlighted the many areas of uncertainty surrounding the development in relation to emission levels and the health consequences of these, particularly for more vulnerable groups in society.

Among the particulates that would be emitted by the plant are a number of chemical compounds of heavy metals. These would be deposited downwind of the plant, as recognised in section 5.1 of the Addendum. However, the reassuring conclusions based on the measurements of background levels at Craigie should not be grounds for complacency, given the uncertainty over the emissions which would be produced by the plant. Over the projected lifetime of the plant these could lead to toxic levels of, typically, chromium and arsenic compounds at **soil level**, with the potential of finding their way into the food chain.

¹⁶ Crouse, DL, et al, 2012, Risk of Nonaccidental and Cardiovascular Mortality in Relation to Long-term Exposure to Low Concentrations of Fine Particulate Matter: A Canadian National-Level Cohort Study, in Environmental Health Perspectives, Vol 120, No 5, pp 708-714, May 2012.

The contaminated caustic **waste ash** removed from the plant is estimated to total 12,000 tonnes per annum, and as it would contain toxic chemicals it would have to be transported away from the site for disposal in regulated landfill sites. We understand these could be at a distance of between 40 and 70 km from the plant, incurring risks through spillage both to the personnel handling the waste and to the environment at different stages during this removal process. Approval of the plant would be directly contrary to **Scotland's Zero Waste Policy** which seeks to eliminate disposal in landfill.

The large scale transformation of plant nutrients into landfill waste and noxious emissions demonstrates incontrovertibly the fallacy of claims based on the carbon cycle that energy from biomass is clean and "renewable".

4. CO₂ emissions, and the implications for Scotland's commitment to reduce greenhouse gas emissions

Unlike solar, wind and tidal energy, large-scale biomass plants producing electricity would actually add to carbon emissions and make it more difficult for Scotland to achieve its ambitious emission reduction targets for 2020 and 2050. This is a form of air pollution with impacts far beyond Dundee, which will add to the problems of disruptive climate change and extreme weather events experienced in Dundee and around the globe.

The Addendum makes no reference to CO₂ emissions as the modelling carried out for the original application calculates a 60% reduction in CO₂ emissions compared with coal production. These calculations are taken over the full lifecycle of the trees used as fuel, however, and fail to recognise two main problems: carbon debt, and indirect land use change.

"Carbon debt"

Research carried out since the original application was submitted in 2010, using statistics published by DECC in the UK Bioenergy Strategy¹⁷, shows how the use of whole trees for electricity production results in immediate greenhouse gas emissions to the atmosphere which are 49% higher over 40 years than when burning coal for the same electricity output. This means that investment in large scale biomass plants, largely reliant on imported fuel derived from whole trees, primarily to produce electricity, would not only be completely contrary to the Scottish Government policy set out in the 2012 Electricity Generation Policy Statement, but would increase carbon emissions rather than reducing them. Regrowth of the trees takes decades, so that by the time these emissions were re-sequestered from the atmosphere by new trees, the biomass plants would have already contributed to an increase in emissions up to and beyond the 450 ppm level which governments are seeking to avoid.

Forth Energy's model relies on the use of fast-growth timber with a short rotation cycle, which would have a much faster CO₂ re-absorption rate. This assumes, however, that there is a source of this timber waiting to be bought at an affordable price. Yet Forth Energy does not have any contracts in place, and recent reports show that demand for woody biomass is increasing steadily around the world, including demand from new markets, in particular China. Forth Energy's

¹⁷ RSPB, Friends of the Earth and Greenpeace, 2012, Dirtier than Coal. Summary available at http://www.rspb.org.uk/Images/biomass_report_tcm9-326672.pdf

assumption that it can secure long-term contracts for supply of this fuel from “sustainable sources” at an affordable price seems naïve, and designed to give the most favourable scenario for consideration of its application. If the plants were to be approved, the company would have to compete for “sustainable sources” of timber with other companies trying to meet sustainability criteria. The logic of the market is that timber prices would go up, and Forth Energy is likely to have to resort to the cheapest sources of timber it could get on the world market and this could include clearance of natural forest.

The “Dirtier than Coal” report⁸ also highlights how the additional demand for roundwood and sawlogs as biomass fuel would result in those who use timber for construction and furniture having to use substitute materials such as concrete and plastic, with a consequent increase in embedded carbon emissions.

Indirect Land Use Change

The other consequence of the increase in demand is that production would have to be expanded and intensified in overseas countries, with native forest, marginal scrub land and low production farmland being converted to forest plantations. Aside from the consequences for local communities, biodiversity and food prices, this clearance of existing forest and scrub adds to carbon emissions, as has been shown particularly in the case of biofuel production in SE Asia and South America.

Like the issues of carbon debt and materials substitution, this is not recognised in the sustainability criteria which the UK and Scottish Governments are adopting for biomass. However, DECC appears to have recognised that its model is flawed as it has been carrying out new research into different scenarios for production of woody biomass which takes account of these effects, and confirms that the intensification of forest management for biomass production results in higher emissions than the UK grid average. This new DECC approach is called the “Biomass Emissions and Counterfactual Model”.¹⁸

Inefficient use of the biomass resource

One of the main problems with the proposed biomass plant at Dundee is that it is intended primarily to produce electricity, as there is a guaranteed market and, since the recent changes to the Renewables Obligation legislation, there is also a guaranteed subsidy provided it produces some heat and achieves an efficiency level of just 35%. This is only half the 70% efficiency for industrial CHP from biomass required by the EU Renewable Energy Directive. Biomass plants which are designed to produce heat, or CHP with primarily heat production, are much more efficient, as the Scottish Government’s Electricity Generation Strategy recognises. A plant achieving 70% efficiency would only produce half the CO₂ emissions per unit of energy output compared with one achieving 35% efficiency.

¹⁸ See this website covering the current DECC research: <https://connect.innovateuk.org/web/carbon-sequestration-and-storage/articles/-/blogs/decc-biomass-feedstock-carbon-calculator-workshop-1;jsessionid=50CEBCFF0446587A840F2C8631392FBB.2dd13a02eab> and this summary of the research: http://www.foe.co.uk/resource/briefing_notes/burning_wood_for_power.pdf

5. Conflict with Scottish Government Electricity Generation Strategy 2012

It is important to reiterate the points made in Section 4, that the type of plant proposed by Forth Energy is entirely at odds with the policy for the use of woody biomass set out in the Scottish Government's Electricity Generation Strategy, published only a year ago, and in the National Planning Framework II. It has to be said that the recent changes to the Renewables Obligation regime, which would permit subsidies for a plant producing primarily electricity at an efficiency level of only 35%, also run completely counter to this policy.

The Electricity Generation Policy Statement sets out clearly the reasons why biomass should be used:

- primarily to produce heat, to achieve higher efficiency;
- off the gas grid, to maximise carbon savings; and
- at a small scale, so that fuel can be sourced locally and the heat can be used efficiently.

If imported biomass is used, *"it should be used in plants that support maximum heat use and decentralised energy production"*. This is necessary *"to encourage the most efficient and beneficial use of what is a finite resource."*¹⁹

What Forth Energy is proposing is a large scale plant producing primarily electricity in a location where it is difficult and expensive to supply customers with the relatively small amount of heat which it will produce. It would be situated in a city centre, not in a location off the gas grid. It would use predominantly imported wood from whole trees, and far from making the most efficient and beneficial use of this finite resource, it would be highly wasteful and emit dangerous pollutants into an already heavily polluted urban area. **The application should therefore be rejected as it fails to satisfy any of the policy criteria set by the Scottish Government.**

Conclusions and Recommendations – see Annex 1, following

¹⁹ Scottish Government Draft Electricity Generation Policy Statement 2012, paragraphs 52-53, pp.17-18.

Conclusion and recommendations

Despite the air quality research carried out on behalf of Forth Energy for the Addendum, significant uncertainties remain, over:

- the use of a model for calculating NO₂ which neglects important aspects of the chemistry of atmospheric processes and lacks data on ozone levels which it requires for any degree of credibility
- projected background traffic levels, given that the research was carried out during a period of disruption due to roadworks, against a background of suppressed economic activity
- the levels of particulate emissions, seriously underestimated by Forth Energy, and the likelihood that these would at certain times be blown through existing “hotspots” in central and eastern Dundee
- the short-term and long-term impacts on public health of even low levels of particulates in the atmosphere, particularly the very fine particulates (PM_{2.5}) which biomass combustion produces in large quantities
- the levels of emissions of dioxins, furans and heavy metals and the risk of accumulation of these in soils
- the levels of CO₂ emissions and the consequences for Scotland’s emission reduction targets.

We therefore conclude that the Addendum has failed to satisfy the request by Dundee City Council for *“comprehensive air quality information demonstrating that the development will not have an adverse impact on air quality and public health.”*²⁰ and that it should be rejected as inadequate by the City Council. If the City Council nevertheless accepts the Addendum as satisfactory and allows the application to proceed for decision by Ministers, we would urge Ministers to reject the application for the reasons set out in this submission together with the reasons set out in our previous submission of 24 September 2010. It is completely contrary to the Government’s policy on the best use of biomass for energy production.

The legal responsibilities of Government for protecting the public from the effects on their health of air pollution were asserted by the UK Supreme Court on 1 May 2013²¹. Any new developments which could add to air pollution in areas which currently fail to satisfy the European air quality directive, such as Dundee, should not be permitted to proceed unless effective measures are being taken to reduce overall emission levels. Should mitigation measures not be effective, Governments could be subject to legal action for failing to meet their responsibilities to protect the public from these effects.

Andrew Llanwarne, Co-ordinator, Friends of the Earth Tayside
16 May 2013

²⁰ Quote taken from the City Council’s motion of 24 January 2011 in response to the original application

²¹ See this report on the Supreme Court decision: <http://www.guardian.co.uk/environment/2013/may/01/government-pollution-supreme-court>

Hospital Discharges with a Primary Diagnosis of Diseases of the Respiratory System by Geo Urban/Rural 8-Fold Grouping in 2011/12

| ICD10 Code | Primary Diagnosis | Accessible Rural | Accessible Small Towns | Large Urban Areas | Other Urban Areas | Remote Rural | Remote Small Towns | Very Remote Rural | Total |
|----------------|---|------------------|------------------------|-------------------|-------------------|--------------|--------------------|-------------------|-------------|
| J01-J09 | Acute Upper Respiratory Infections | 152 | 55 | 514 | 226 | 37 | 29 | 2 | 1015 |
| J10-J19 | Influenza And Pneumonia | 316 | 168 | 1043 | 590 | 96 | 72 | 4 | 2289 |
| J20-J29 | Other Acute Lower Respiratory Infections | 192 | 97 | 604 | 382 | 63 | 55 | 5 | 1398 |
| J30-J39 | Other Diseases Of Upper Respiratory Tract | 76 | 31 | 222 | 111 | 26 | 18 | 4 | 488 |
| J40-J49 | Chronic Lower Respiratory Diseases | 276 | 104 | 1126 | 583 | 67 | 78 | 7 | 2241 |
| J60-J79 | Lung Diseases Due To External Agents | 41 | 23 | 145 | 78 | 16 | 7 | 2 | 312 |
| J80-J89 | Other Respiratory Diseases Principally Affecting The Interstitium | 34 | 22 | 145 | 80 | 4 | 6 | | 291 |
| J90-J99 | Other Diseases Of Pleura | 78 | 53 | 282 | 136 | 24 | 12 | | 585 |
| J00-J99 | Diseases of the Respiratory System | 1165 | 553 | 4081 | 2186 | 333 | 277 | 24 | 8619 |

Hospital Discharge Rates per 1000 Population with a Primary Diagnosis of Diseases of the Respiratory System by Geo Urban/Rural 8-Fold Grouping in 2011/12

| ICD10 Code | Primary Diagnosis | Accessible Rural | Accessible Small Towns | Large Urban Areas | Other Urban Areas | Remote Rural | Remote Small Towns | Very Remote Rural | Total |
|----------------|---|------------------|------------------------|-------------------|-------------------|--------------|--------------------|-------------------|--------------|
| J01-J09 | Acute Upper Respiratory Infections | 1.92 | 2.05 | 3.34 | 2.18 | 1.58 | 1.83 | 0.74 | 2.50 |
| J10-J19 | Influenza And Pneumonia | 3.98 | 6.26 | 6.78 | 5.69 | 4.10 | 4.54 | 1.48 | 5.64 |
| J20-J29 | Other Acute Lower Respiratory Infections | 2.42 | 3.61 | 3.93 | 3.68 | 2.69 | 3.47 | 1.85 | 3.45 |
| J30-J39 | Other Diseases Of Upper Respiratory Tract | 0.96 | 1.15 | 1.44 | 1.07 | 1.11 | 1.13 | 1.48 | 1.20 |
| J40-J49 | Chronic Lower Respiratory Diseases | 3.48 | 3.87 | 7.32 | 5.62 | 2.86 | 4.92 | 2.58 | 5.52 |
| J60-J79 | Lung Diseases Due To External Agents | 0.52 | 0.86 | 0.94 | 0.75 | 0.68 | 0.44 | 0.74 | 0.77 |
| J80-J89 | Other Respiratory Diseases Principally Affecting The Interstitium | 0.43 | 0.82 | 0.94 | 0.77 | 0.17 | 0.38 | 0.00 | 0.72 |
| J90-J99 | Other Diseases Of Pleura | 0.98 | 1.97 | 1.83 | 1.31 | 1.02 | 0.76 | 0.00 | 1.44 |
| J00-J99 | Diseases of the Respiratory System | 14.68 | 20.60 | 26.55 | 21.07 | 14.21 | 17.46 | 8.86 | 21.24 |

Source : SMR01 via AcaDMe – supplied by NHS Tayside, 28.3.13

